

EXHIBIT D

THE HANDBOOK OF MORTGAGE-BACKED SECURITIES

Sixth Edition

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Editor

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CHAPTER
SIX

CREDIT ENHANCEMENTS FOR NONAGENCY MBS PRODUCTS

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The investor in nonagency mortgage-backed securities products is exposed to credit risk. Because there is no explicit or implicit government guarantee, all nonagency securities are credit enhanced in order to obtain a specific credit rating for each tranche in a deal. Credit enhancement mechanisms can take various forms, both from external parties and within the structure of the deal. External credit enhancement mechanisms are third-party guarantees. Internal credit enhancement mechanisms are forms of self-insurance. In addition, derivative instruments, specifically interest-rate swaps and interest-rate caps, can be used as a form of credit enhancement. The credit enhancement mechanism(s) used are those that provide the seller with the best execution. That is, it will maximize proceeds from the sale of the pool of mortgage loans after credit enhancement expenses (implicit and explicit) are taken into account.

This chapter examines and explains the various forms and usages of credit enhancement in mortgage-backed securities (MBS) and mortgage-related asset-backed securities (ABS). It discusses issues related to both internal and external credit enhancement and how differences in collateral quality and expected credit performance influence the form and amount of enhancement needed. It concludes with a discussion of how interest-rate derivatives are used for hedging interest-rate risk.

EXTERNAL CREDIT ENHANCEMENTS

External credit enhancements come in the form of third-party guarantees that provide for first-loss protection against losses up to a specified amount. Historically, the most common forms of external credit enhancements have been (1) a letter of

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credit, (2) bond insurance, and (3) pool insurance. A structure with external credit support is subject to the credit risk of the third-party guarantor. Should the third-party guarantor be downgraded, the tranches of a transaction guaranteed by that entity could be subject to downgrade depending on the historical performance of the collateral. This is the chief disadvantage of third-party guarantees.

External credit enhancements do not materially alter the cash-flow characteristics of a structure except in the form of prepayment. In case of a default resulting in credit losses within the guarantee level, investors will receive the principal amount as if a prepayment has occurred. If the credit losses exceed the guarantee level, investors may realize a shortfall in the cash flow.

Letter of Credit

A bank letter of credit (LOC), one of the oldest forms of credit enhancement but one that has been used rarely in recent years, is a financial guarantee by the issuing bank. The financial guarantee specifies that the issuing bank is committed to reimburse credit losses up to a predetermined amount. In the case of nonagency MBS products, a top-rated international bank is used to provide coverage of credit losses on the underlying mortgage pool that is less than 100% of the pool but an amount sufficient to obtain a triple-A rating.

There are two reasons for the decline in the popularity of LOCs for credit enhancing nonagency MBS products. First, there are few banks that have retained triple-A ratings, and even for those that have, there is the risk that they will be downgraded in the future. As noted earlier, a downgrading may result in the downgrading of the affected tranches. Second, risk-based capital requirements have changed since this form of credit enhancement was first popular. These requirements made it more expensive for banks to issue a letter of credit, thereby increasing the cost to entities seeking to use it as a form of credit enhancement.

Bond Insurance¹

Bond insurance, also called a *surety bond*, is a financial guarantee from a monoline insurance company. The guarantee is for the timely payments of principal and interest if these payments cannot be satisfied from the cash flow from the underlying mortgage pool. The principal payments will be made without acceleration, except if the insurer elects to do so. The monoline insurers that are primary insurers are Ambac Assurance Corporation (Ambac), Financial Guaranty Insurance Corporation (FGIC), Financial Security Assurance (FSA), Municipal

1. For a more detailed discussion of bond insurance, see Mahesh K. Kotecha, "The Role of Financial Guarantees in Asset-Backed Securities," Chapter 6 in Frank J. Fabozzi (ed.), *Issuer Perspectives on Securitization* (Hoboken, NJ: Wiley, 1998).

Bond Insurance Corporation (MBIA), and BIAXLCA/XLFA, whereas the reinsurers are ACE Guaranty Re, AXA Re Finance, Enhance Re, and RAM Re.

Based on historical experience with financial guarantees by monoline insurers, capital market participants have a high degree of confidence in bond insurance because no investor in any bond-insured security failed to receive a single timely payment of principal or interest. Moreover, downgrade risk is viewed as minimal because no U.S. financial guarantee company has been downgraded. Investors realize another benefit from bond insurance. While rating agencies face reputational risk when assigning a rating to a security, monoline insurers are placing their own capital and credit rating at risk. Hence investors can correctly expect that the transaction structure is inherently safe and will remain so over the life of the securities guaranteed.

Pool Insurance

Bond insurance covers losses resulting from defaults and foreclosures. Policies typically are written for a dollar amount of coverage that continues in force throughout the life of the pool. Since only defaults and foreclosures are covered, additional insurance must be obtained to cover losses resulting from bankruptcy, fraud arising in the origination process, and special hazards. Each of these is discussed below.

When a borrower files for personal bankruptcy, there is a risk that a bankruptcy judge could reduce the borrower's mortgage debt. This debt reduction, called a *cramdown*, usually occurs only when the value of the borrower's home has fallen so that the mortgage loan balance exceeds the home's market value. If a cramdown is ordered, the loan's terms can be altered by reducing the unpaid principal balance or the loan's interest rate. A few cramdowns have occurred in recent years in settling Chapter 13 bankruptcy cases.² However, the 1993 Supreme Court case of *Nobelman versus American Savings* ruled that a borrower filing under Chapter 13 cannot effectively reduce his or her mortgage debt.

Another potential risk that the cash flows will be impaired arises from borrower fraud or misrepresentation during the application process. This type of risk often is not covered by the originator/conduit/sellers' representations and warranties. The risk of losses owing to fraud is front-loaded. That is, borrowers who misrepresent their income, employment, or net worth generally will run into payment problems early in the loan's life. Therefore, fraud coverage is largest at issuance.

2. A mortgage borrower can file for personal bankruptcy under Chapter 7, Chapter 11, or Chapter 13.

Chapter 13 allows for restructuring or forgiving debts while letting borrowers retain their assets. In a Chapter 7 bankruptcy filing, a type of bankruptcy that generally involves liquidation of assets to make payments to creditors, cramdowns also have been disallowed under a Supreme Court ruling. Cramdown filings under Chapter 11 are more rare than those under Chapter 7 or Chapter 13 because of their cost and complexity. Jumbo loan borrowers are more likely to file under Chapter 11 because this section can be used only when the debtor's secured debt exceeds \$350,000.

Special-hazard losses result from properties damaged by earthquakes, mud slides, tidal waves, volcanoes, or floods. Such losses are excluded from coverage under homeowners' and private mortgage insurance policies. Subordinate tranches absorb special-hazard losses up to a predetermined capped amount that declines as the mortgage pool amortizes. This "capped" amount is determined by the rating agencies. Special-hazard losses in excess of this capped amount are distributed among the senior and subordinate classes pro rata. Historically, losses from special hazards are quite rare because special casualty insurance often is required on homes in high-risk areas (i.e., flood insurance in flood zones and earthquake insurance along known fault lines), and damage caused indirectly by an act of God, such as water damage or fire caused by an earthquake, can be covered under standard homeowners' policies.³

INTERNAL CREDIT ENHANCEMENTS

Internal credit enhancements come in more complicated forms than external credit enhancements and may alter the cash-flow characteristics of the loans even in the absence of default. Credit enhancement levels (i.e., the amount of subordination for each form of enhancement used within a deal) are determined by the rating agencies from which the issuer seeks a rating for the tranches. This is referred to as "sizing" the transaction and is based on the rating agencies' expectations for the performance of the loans collateralizing the deal in question. Typically, a triple- or double-A rating is sought for the deal's most senior tranches. The type and amount of credit enhancement used in a deal represent the intersection of the issuer's need to maximize deal proceeds and the rating agencies' judgment with respect to how much credit enhancement is required to bestow the desired rating on the senior tranches.

The most common forms of internal credit enhancements are senior/subordinate structures, overcollateralization, and reserve funds. The credit enhancement forms are used both individually and in combination, depending on the loan types in question. Typically, loan products where credit performance is historically strong (e.g., prime jumbo fixed-rate loans) are executed in senior/subordinate structures because the credit enhancement required is relatively small, and the senior/subordinate structure offers efficient execution. Deals backed by lower-quality loans require higher levels of enhancement and typically use a combination of the above-referenced credit enhancement forms.

3. Another important factor is land value. In costly areas of the country, the value of land can represent more than 50% of the value of a single-family home. Thus, if a home is totally destroyed, the land value acts as a floor in terms of the loan's loss severity. Finally, where damage to property caused by special hazards is uninsured, the homeowner often can get access to low-cost government funds to help rebuild. Therefore, special hazards historically have not resulted in significant losses. In addition, geographic diversification can help to limit a pool's exposure to special-hazard risk.

Most structured transactions that employ internal credit enhancements follow a predetermined schedule that prioritizes the manner in which principal and interest generated by the underlying collateral must be used. This schedule, which is set down in the deal's prospectus, is known as the *cash-flow waterfall* or, simply, the *waterfall*. At the top of the waterfall would be cash flows owing to senior bondholders (interest and principal, depending on the principal payment schedule), as well as some standard fees and expenses (e.g., the servicing fee). After the cash-flow obligations at the top of the waterfall are met, cash flows down to lower-priority classes (AA, A, BBB tranches, etc.).

The cash flows that remain after all the scheduled periodic payment obligations are met is the excess spread. In a sense, therefore, this excess spread is the first line of defense against collateral losses because deals that are structured to have a large amount of excess spread can absorb relatively large levels of collateral losses. If the excess spread is fully eaten away by losses, the next-lowest-rated class will begin to be negatively affected by credit losses. While all deals have a waterfall, the term is used most commonly in deals collateralized by subprime loans and other products that required larger amounts of credit enhancement.

Senior/Subordinate Structure

The most widely used internal credit enhancement structure is by far the senior/subordinate structure. Today, a typical structure will have a senior tranche and one or more subordinate tranches. The issuer will seek a triple-A or double-A rating for the senior tranche. The subordinate tranches will have lower ratings—investment grade and noninvestment grade. Typically, the most junior subordinate tranche—referred to as the “first-loss piece”—will not be rated.

Exhibit 6–1 shows a hypothetical \$400 million structure with a senior tranche representing 92.25% of the deal and five subordinate tranches representing 7.75% of the deal. Note that all that has been done in this structure is “credit tranching.”

EXHIBIT 6–1

Hypothetical \$400 Million Senior/Subordinate Structure

Bond	Rating	Amount (\$millions)	Percent of deal (%)
Senior	AAA	\$369	92.25
Subordinate:			
X1	AA	8.00	2.00
X2	A	4.00	1.00
X3	BBB	6.00	1.50
X4	BB	8.00	2.00
X5	Not rated	5.00	1.25

The senior or any of the subordinate tranches then can be carved up to create other tranches such as sequential pays.

The first-loss piece in this hypothetical deal is tranche X5. The subordination level in this hypothetical structure is 7.75%. The subordinate tranches will absorb all losses up to \$31 million, and the senior tranche will start to experience losses thereafter. Thus, if there is a \$20 million loss, no loss will be realized by the senior tranche. If, instead, there is a \$40 million loss, the senior tranche will experience a loss of \$9 million (\$40 million minus \$31 million), or a 2.4% loss (\$9/\$369).

In the case where the loss is \$20 million, tranches X5, X4, and X3 absorb \$19 million. These tranches will realize a loss experience of 100%. Tranche X2 will realize a loss of \$1 million, thereby having a loss experience of 25% (\$1/\$4). Tranche X1 will not realize any loss. If the loss is \$40 million, all subordinate tranches will have a loss experience of 100%.

The subordinate tranches obviously would require a yield premium in order for an investor to take on the greater credit risk exposure relative to the senior tranche. This setup is another form of self-insurance wherein investors in the senior tranche are giving up yield spread to the investors in the subordinate tranches. This form of credit enhancement still does not affect cash-flow characteristics of the senior tranche except in the form of prepayment. To the extent that losses are within the subordination level, investors in the senior tranche will receive principal as if a prepayment has occurred.

Almost all existing senior/subordinate structures also incorporate a shifting interest structure. This structure redirects principal prepayments and certain liquidation proceeds disproportionately from the subordinate tranche to the senior tranche according to a specified schedule. The rationale for the shifting interest structure is to have enough subordinate tranches outstanding to cover future credit losses.⁴ I will discuss the shifting interest structure next.

Senior/Subordinate Structure with a Shifting Interest Mechanism

The basic credit concern that investors in the senior tranche have is that while the subordinate tranches provides a certain level of credit protection for the senior tranche at the closing of the deal, the level of protection may deteriorate over time owing to prepayments and certain liquidation proceeds. The objective is to distribute these payments of principal such that the credit protection for the senior tranche does not deteriorate over time.

The percentage of the mortgage balance of the subordinate tranche to that of the mortgage balance for the entire deal is called the *level of subordination* or the *subordinate interest*. The higher the percentage, the greater is the level of protection. The subordinate interest changes after the deal is closed owing to prepayments and certain liquidation proceeds. That is, the subordinate interest shifts (hence the term *shifting interest*). The purpose of a shifting interest mechanism is to allocate

4. Because of the shifting interest structure, the subordination amount actually may grow in time, especially in a low-default and fast-prepayment environment. This is sometimes referred to as "riding up the credit curve."

prepayments and certain liquidation proceeds so that the subordinate interest is maintained at an acceptable level to protect the senior tranche.

Now let's be more specific about how the shifting interest mechanism works. The *senior percentage* is defined as the ratio of the balance of the senior tranche to the balance of the entire deal. It is also called the *senior interest* and is equal to 100% minus the subordinate interest. The prospectus will specify how different types of principal repayments will be allocated between the senior tranche and the subordinate tranche. There are five types of principal repayments:

1. Scheduled principal payments
2. Prepayments (full and partial)
3. Repurchase principal
4. Recovery principal
5. Realized losses (principal portion)

The scheduled principal payments are allocated based on the senior percentage. Thus, if in some month the senior percentage is 82% and the scheduled principal payment is \$1 million, the senior tranche will get \$820,000 and the subordinate tranche \$180,000.

Allocation of the other four types of principal repayments is based on the *senior prepayment percentage*.⁵ This is defined as follows:

$$\text{Senior percentage} + \text{shifting interest percentage} \times \text{subordinate interest}$$

The shifting interest percentage in this formula is specified in the prospectus, and I will provide an illustration shortly. To illustrate the formula, suppose that in some month the senior interest is 82%, the subordinate interest is 18%, and the shifting interest percentage is 70%. The senior prepayment percentage for that month is

$$82\% + 0.70 \times 18\% = 94.6\%$$

Thus, if prepayments for the month are \$100,000, then \$94,600 is allocated to the senior tranche and \$5,400 to the subordinate tranche.

The prospectus will provide the shifting interest percentage schedule for calculating the senior prepayment percentage. For fixed-rate mortgages, a commonly used shifting interest percentage schedule is as follows:

Year after Issuance	Shifting Interest Percentage
1-5	100
6	70
7	60
8	40
9	20
After year 9	0

5. In some deals it is called the *accelerated-distribution percentage*.

The shifting interest percentage schedule given in the prospectus is the “base” schedule. The schedule can change over time depending on the performance of the collateral. If the performance is such that the credit protection is deteriorating or may deteriorate, the base shifting interest percentages are overridden, and a higher allocation of prepayments is made to the senior tranche. Performance analysis of the collateral is undertaken by the trustee for determining whether to override the base schedule. The performance analysis is in terms of tests, and if the collateral or structure fails any of the tests, this will trigger an override of the base schedule. These tests include the principal loss test, the delinquency test, and the balance test. I will discuss these shortly.

While the shifting interest structure is beneficial to the senior tranche holder from a credit standpoint, it does alter the cash-flow characteristics of the senior tranche even in the absence of defaults. The size of the subordination also matters. A larger subordinate class redirects a higher proportion of prepayments to the senior class, thereby shortening the average life even further.⁶

Most senior/subordinate structures provide a “carve-out” for fraud. The carve-out sets aside a small portion of the deal’s collateral to absorb losses due to fraud.

Overcollateralization

The total par value of the tranches is the liability of the structure. Thus, if a structure has two tranches with a par value of \$400 million, then this is the amount of the liability. The amount of the collateral backing the structure must be at least equal to the amount of the liability. If the amount of the collateral exceeds the amount of the liability of the structure, the deal is said to be *overcollateralized*. The amount of overcollateralization represents a form of internal credit enhancement because it can be used to absorb losses. For example, if the liability of the structure is \$400 million and the collateral’s value is \$410 million, then the structure is overcollateralized by \$10 million. Thus the first \$10 million of losses will not result in a loss to any of the tranches in the structure.

Overcollateralization can be generated after the transaction *closes* through excess spread. In addition, the collateral in a transaction may be divided into separate groups, each supporting a separate class of bonds. An example occurs in home equity loan transactions, where some classes of bonds are supported by fixed-rate loans and

6. It may be counterintuitive that the size of the subordination should affect the average life and cash flow of the senior class more than the credit quality. This is so because the size of the subordination is already factored into the rating. The rating agency typically requires more subordination for lower-credit-quality loans to obtain a triple-A rating and less subordination for better-credit-quality loans. From a credit standpoint, the investor may be indifferent between a 5% subordination on a package of good-quality loans and a 10% subordination on a package of lower-quality loans as long as the rating agency gives them the same rating. However, the quality of the underlying loans will determine the default rate and therefore the timing of the cash flow.

other classes of bonds are supported by adjustable-rate loans. As explained next, each group of assets will have excess spread. The excess spread will be used first to support the class of bonds created from the same group of loans. After the spread is used to enhance the class of bonds it supports, any remaining spread can be used to enhance the class of bonds of other loan groups. This feature is called a *cross-support provision*, and this type of enhancement is called a *cross-collateralization*. The manner and conditions for applying a cross-support provision are explained in the prospectus supplement.

Reserve Funds

Reserve funds come in two forms, cash reserve funds and excess spread. *Cash reserve funds* are straight deposits of cash generated from issuance proceeds. In this case, part of the underwriting profits from the deal are deposited into a hypothecated fund that typically invests in money market instruments.

Excess spread accounts involve the monthly allocation of excess spread or cash into a separate reserve account after paying out the net coupon, servicing fee, and all other expenses. For example, suppose that (1) the gross weighted-average coupon (gross WAC) for the mortgage pool is 7.75%, (2) the servicing and other fees are 0.25%, and (3) the net weighted-average coupon (net WAC) of the bond classes issued is 7.25%. This means that there is excess servicing of 0.25% (7.75% minus 0.25% minus 7.25%). The amount in the reserve account will increase gradually and can be used to pay for possible future losses.

The excess spread is analogous to the guarantee fee paid to the issuer of an agency MBS except that this is a form of self-insurance. As described previously, excess spread acts as the first line of credit support for the deal. This form of credit enhancement relies on the assumption that defaults occur infrequently in the very early life of the loans but increase gradually in the following two to five years, an assumption consistent with the Public Securities Association's (PSA's) standard default assumption (SDA) curve.

If losses on a deal are low, the excess spread will increase. At this point, the excess spread can be deployed within the deal in a number of forms. In some deals, some of the excess spread may be used to pay additional principal to bonds within the deal. Generally speaking, however, the excess spread is part of the "equity" of a deal. At some point, excess spread will be released to either the owner of the deal's "residual" tranche (i.e., the equity interest in the deal) or to bonds in the deal that are structured to receive these cash flows. Such bonds are referred to as "net interest margin" (NIM) securities.

An important feature in analyzing senior/subordinate tranches is the deal's step-down provisions. These provisions allow for the reduction in credit support over time. As noted earlier, a concern that investors in the senior tranche have is that if the collateral performance is deteriorating, step-down provisions should be altered. The provisions that prevent the credit support from stepping down are called *triggers*. Principal payments from the subordinate tranches are diverted to

the senior tranche if a trigger is reached. The diversion of principal varies from issuer to issuer. The most conservative approach is to stop all principal payments from being distributed to the subordinate tranches. Alternatively, some issuers allow the subordinate tranches to receive regularly scheduled principal (amortization) on a pro rata basis but divert all prepayments to the senior tranche.

There are two triggers based on the level of credit performance required to be passed before the credit support can be reduced: a delinquency trigger and a loss trigger. The triggers are expressed in the form of a test that is applied in each period. The *delinquency test*, in its most common form, prevents any step-down from taking place as long as the current over 60-day delinquency rate exceeds a specified percentage of the then-current pool balance. The *principal-loss test* prevents a step-down from occurring if cumulative losses exceed a certain limit (which changes over time) of the original balance of the mortgage pool.

In addition to triggers based on the performance of the collateral, there is a *balance test*. This test involves comparing the change in the senior interest from the closing to the current month. If the senior interest has increased, the balance test is failed, triggering a revision of the base schedule for the allocation of principal payments from the subordinate tranches to the senior tranche. Unlike a trigger that will increase the allocation to the senior tranche, there are balance tests that will increase the allocation to the subordinate tranche. This can occur where the subordinate interest improved by a significant amount. This amount is set forth in the prospectus. For example, the prospectus may set forth that if the subordinate interest doubles, the base schedule is overridden such that more is allocated to the subordinate tranche.

In discussing internal credit enhancement, it should be emphasized that the goal is to optimize the conflicting needs to create protection for the higher-rated tranches in the deal while maximizing deal proceeds. The market has developed certain structuring conventions for different products and sectors. For example, prime jumbo deals generally receive credit enhancement through a series of subordinate tranches; credit enhancement for subprime deals generally will use a combination of subordination, reserve accounts, and overcollateralization. An important point of note is that these conventions are not dictated by regulatory fiat but are created where credit protection and economic efficiency intersect.

USE OF INTEREST-RATE DERIVATIVE INSTRUMENTS

I conclude this chapter with a discussion of the use of interest-rate derivatives in nonagency MBS products to hedge interest-rate risk. The three types of interest-rate derivatives used in recent mortgage securitizations have been interest-rate swaps, interest-rate caps, and interest-rate corridors. These derivatives are over-the-counter or dealer products, not exchange-traded products. As a result, they expose the trust to counterparty risk.

The use of derivatives in a transaction will be specified in the prospectus supplement as a "permitted asset." For example, here is the enabling language in the